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A prospective comparison between two seizure classifications*

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The International Classification of Epileptic Seizures is the most widely used, but an alternative system based purely on ictal symptoms and signs has been proposed: the semiological classification. Our objective was to compare the two in a sample of patients evaluated at epilepsy centers.

We collected 78 consecutive patients evaluated in outpatient epilepsy clinics who subsequently underwent noninvasive video-EEG monitoring at three centers. Patients with pseudoseizures were excluded. Seizures were first classified based on information obtained during clinic visits, and again after video-EEG monitoring. Each time, seizures were classified using both the International Classification and the semiological classification. Eventual epilepsy syndrome diagnosis was based on all the clinical data, video-EEG monitoring, and other independent tests including imaging studies.

Sixty-six (87%) patients were classified as having 'complex partial seizures' in the International Classification. Using the semiological classification, these same 66 patients were classified as follows: automotor (34), dialeptic (17), hypermotor (13), hypomotor (2). Seizure classification changed between initial 'clinic-based' data and the 'monitoring-based' classification in 27 cases using the ILAE, vs. six using the semiological classification.

Seizure classification tended to change significantly between pre- and post-monitoring using the ILAE but not the semiological classification. The term complex partial seizure included multiple categories of the semiological classification, and was very nonspecific. The semiological classification may be better suited for everyday clinic use, since it is based solely on clinical characteristics.

Key words: seizures; epilepsy; classification; semiology.

INTRODUCTION

Since its introduction in 1981[1], the seizure classification of the International League Against Epilepsy (ILAE) has been almost universally used. However, several of its shortcomings have been described[2,3], and recently the ILAE has officially acknowledged the need for a revision of the classification systems[4]. More specifically, the ILAE has even acknowledged the necessity of a seizure classification based exclusively on seizure semiology[5].

The semiological seizure classification (Table 1), which is based purely on ictal symptoms and signs, was recently proposed[6]. The objective of this study was to compare the two classifications in a sample of patients evaluated at epilepsy centers.

MATERIALS AND METHODS

We collected 78 consecutive patients evaluated in outpatient epilepsy clinics, who subsequently underwent noninvasive video-EEG monitoring at three centers, two in North America and one in Europe. Patients with pseudoseizures were excluded.

Seizures were first classified based on information obtained during clinic visits, and again after video-EEG monitoring. Each time, seizures were classified

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using both the *International*[1] and the *semiological*[6] classification. Eventual syndromic classification was based on all the clinical data, video-EEG monitoring, and other independent tests including imaging studies.

RESULTS

Patients had 1–30 seizures recorded (mean 5.5), for a total of 362 seizures. Sixty-four patients had localization-related epilepsy, while 14 had generalized epilepsy (five idiopathic, nine cryptogenic or symptomatic).

Sixty-six (87%) patients were classified as having 'complex partial seizures' in the International Classification. Of the 66 patients with complex partial seizures, the state of consciousness could not be ascertained in 21: this was caused by lack of adequate testing in 15, abnormal baseline mental status (mental retardation) in four, and age too young in two. Using the semiological classification, these same 66 patients were classified as follows: automotor (34), dialeptic (17), hypermotor (13), hypomotor (two).

Seizure classification changed between initial 'clinic-based' data and the 'monitoring-based' classification in 27 cases using the ILAE, vs. six using the semiological classification.

DISCUSSION

Using the ILAE system, seizure classification tended to change significantly between pre- and post-monitoring (in more than a third of patients). This finding supports the contention that a semiological classification may be better suited for everyday clinic use, which is logical since it is based solely on clinical characteristics. Seizures can easily be classified based on the amount of information available, without having to *assume* the presence of certain symptoms (e.g. impairment of consciousness).

In our sample of patients from referral epilepsy centers, the term 'complex partial seizure' was by far the most common ILAE seizure type. This included multiple categories of the semiological classification, and was very nonspecific. The vast majority of patients were classified as having CPS, often without *definite* evidence for an alteration of consciousness, as others have found[7]. Thus, the term CPS is often used in practice when there is little evidence for the 'complex' characteristic, i.e. alteration of awareness. Furthermore, in practice the term is often used for seizures that turn out to not be partial[8–10], and possibly even for events that are eventually proven to be nonepileptic.

In addition, the over-simplification of classifying almost anything as CPS can have serious consequences, including the choice of wrong medical treatment[10, 11] and the inappropriate use of invasive techniques or surgery. It is because of the nondescript significance of the term 'complex partial seizure', a serious shortcoming of the ICES, that a number of authors have recommended to distinguish between complex partial seizures 'of temporal origin' and other complex partial seizures[12].

The semiological classification allowed more diversity among various clinical seizure types. It was also more concise while being more informative. This is also in agreement with a preliminary study in adults[7], and may be even more important in children[13], in whom electro-clinical correlations are different from adults.

Table 1: Semiological seizure classification (from Reference 6).

1. Auras
   a. Somato-sensory
   b. Visual
   c. Auditory
   d. Gustatory
   e. Olfactory
   f. Autonomic
   g. Abdominal
   h. Psychic
2. Autonomic seizure
3. Dialeptic seizure (Isolated alteration of awareness)
4. Motor seizures
   Simple motor seizures
   - Clonic
   - Tonic
   - Tonic–clonic
   - Epileptic spasm
   - Myoclonic
   - Versive

   Complex motor seizures[a]
   - Automotor
   - Hypermotor
   - Gelastic
5. Special seizures (negative)
   - Aphasic
   - Astatic
   - Atonic
   - Akinetic
   - Hypomotor
   - Negative myoclonic

[a] *Complex motor seizures* are those where the motor symptoms are complex, i.e. cannot be reproduced by focal cortical stimulation (unlike the simple motor seizures). The motor phenomena are well organized and resemble natural movements of everyday life, except that they are inappropriate for the situation.

In addition to its practical aspects, the semiological classification facilitates the distinction between seizure type and epilepsy syndrome, which are often confused and intermixed[14]. This encourages the recommended discipline of making diagnoses of epilepsy syndromes, which is much more beneficial for patient care[14–17]. The distinction between seizure type and

epileptic syndrome is essential because the diagnosis of an epileptic syndrome can be made most reliably and precisely by the convergence of *independent* data. This necessity is particularly true in centers that perform epilepsy surgery. Unfortunately, the current ILAE seizure classification is based not only on seizure semiology but also on EEG and other findings[1]. This lack of independence between seizure and syndrome classification has been noted by others[18], and the ILAE itself has acknowledged the necessity of a seizure classification based exclusively on seizure semiology[5]. In addition, as mentioned earlier, patients with symptomatic generalized epilepsies occasionally have focal seizures, including complex partial ones[19, 20].

Because the semiological classification is novel, we suggest that neurologists, and especially epileptologists, routinely employ both classifications.

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